8.11B PBS SR-0011B Nuclear Materials Stabilization and Disposition-2012

8.11B.1 Background

At the end of the Cold War, the Department of Energy (DOE) was left with a large inventory of nuclear materials in various forms (raw materials, in-process, finished products) and stored in many locations (vaults, reactor basins, etc.). With the decreased need for nuclear materials for the national security mission, the SRS focus shifted from nuclear materials production to nuclear materials stabilization. Issuance of the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1 to stabilize "at-risk" nuclear materials, which might pose a significant risk to the safety of the workers, the public, and/or the environment provided further impetus for these materials stabilization activities. The DNFSB issued Recommendation 2000-1 to amplify this concern. SRS has made significant progress in that more than 89% of the scheduled nuclear materials have been stabilized (127,355 of 143,311 items) and 49 of the 54 DNFSB commitments have been completed.

The capability to store containers of plutonium and perform surveillance on the containers to validate the storage requirements of DOE-STD-3013 is being installed in 235-F, as well as the required security and facility upgrades to support the facility missions.

8.11B.2 End State

The end state for the 3013 Container Surveillance and Storage Capability Project is to be operable in building 235-F. Upon project completion, the project responsibility will be transferred to PBS SR-0011C.

Once Receiving Basin for Offsite Fuels (RBOF), F Canyon, and H Canyon are deactivated, these facilities will be maintained in a minimal surveillance and maintenance condition until transferred to PBS SR-0040 for decommissioning.

8.11B.3 Scope and Description

This PBS funds deinventory of RBOF, design and installation of 3013 Container Surveillance and Storage Capability in building 235-F, and operation of the F and H Canyon facilities to complete stabilization and/or disposition of EM legacy nuclear materials The remaining materials to be stabilized and/or dispositioned include classified metals and composites received from the Rocky Flats Environmental Technology Site; SRS metals, oxides, and residues; depleted uranyl nitrate solutions; depleted uranium oxide; and low-enriched uranium oxide. Other DOE program offices are funding some activities that occur concurrently with EM mission work associated with H Canyon, e.g., National Nuclear Security Administration (NNSA) highly enriched uranium (HEU) blend down. Once the aforementioned scope is completed, deactivation of RBOF, F Canyon, and H Canyon facilities will

commence in preparation for turnover for decommissioning. SRS will deactivate the RBOF facility in FY 2004, an acceleration of 24 mo from the previous plan. F Area processing and support facilities will be deactivated by November 30, 2006, an acceleration of 22 mo from the previous plan. Beginning in FY 2011, H Canyon and HB Line facilities will begin deactivation. Following deactivation, these facilities will be maintained in a minimum surveillance and maintenance condition until transferred to PBS SR-0040 for decommissioning.

Integral to this Performance Management Plan (PMP) are the activities that support the accelerated deactivation of F Canyon. These include:

- shutdown of Low Activity Waste and General Purpose Evaporators, and the Acid Recovery Unit
- elimination of substantial surveillance and maintenance costs by disposition of the depleted uranium solutions and relocation of the PUREX solvent
- disposition of depleted uranium oxide from buildings 221-12F, 221-21F, 728-F, 730-F, 714-7N, and 105-R
- elimination of infrastructure and safeguards and security requirements for significant portions of F Area.

Packaging and stabilization of metal and oxides in FB Line is ongoing and will be complete in FY 2005.

The scope associated with the disposition of depleted uranium oxide from building 221-22F will be completed in FY 2007.

The deinventory and shutdown of FB Line will be facilitated by adding an interim Limited Extended Surveillance (LES) capability in building 235-F to perform container integrity surveillances, which conforms to DOE-STD-3013, while a permanent 3013 Container Surveillance and Storage Capability is constructed in the facility.

Materials targeted for stabilization and/or disposition in H Canyon and HB Line include:

- Pu^{239} solutions
- HEU solutions
- neptunium solutions
- unirradiated Mk-22 tubes to support the NNSA Interagency Agreement
- miscellaneous fuels
- SRS plutonium residues
- enriched uranium residues.

H Canyon and HB Line will remain operational through FY 2010. During this timeframe, the primary focus will be on the disposition of materials at SRS.

H Canyon will continue dissolution of Mk-22 fuel tubes as necessary to meet Tennessee Valley Authority (TVA) specifications. Once the Mk-22 fuel tube campaign is complete, other legacy materials identified by DOE including specific Spent Nuclear Fuel (SNF) Environmental Impact Statement Table 5.2-1 materials (DOE-EIS-0279), core filter block metal, and Sodium Reactor Experiment material will then be processed. Some of these materials may be dissolved and transferred to the high-level waste system.

The HB Line facility will continue to operate Phase I and II production lines to process materials identified by DOE. Some materials will be targeted for dissolution and transfer to the high-level waste system for disposition, while other materials will be converted to an oxide and stored in 3013 containers or shipped offsite.

HB Line Phase I will be utilized to complete the processing of Idaho National Engineering and Environmental Laboratory (INEEL) Denitrator product oxide followed by plutonium-bearing material suitable for dissolution and transfer to the high-level waste system. HB Line Phase II process will be utilized to complete Np^{237} conversion to oxide and its subsequent transfer to DOE Oak Ridge facilities. HB Line will then transition to processing certain remaining materials at SRS.

Also included in this project is a modification to the ventilation system for the H Canyon facility by FY 2006.

8.11B.4 Responsibilities

In addition to the overall responsibilities identified in Section 4.3, PBS-specific responsibilities are summarized as follows.

This PBS falls under the responsibility of the DOE-SR Assistant Manager for Nuclear Materials Stabilization Project. In accordance with DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*, a Federal Project Director has been identified to manage this PBS and will be approved by EM-1. The Federal Project Director uses an Integrated Project Team (IPT) approach to manage the PBS. The IPTs are comprised of personnel from a wide variety of disciplines to ensure the work is managed safely and effectively.

The performance of the work scope for this PBS is the responsibility of the management and operating (M&O) contractor. Currently, the contractor is Westinghouse Savannah River Company (WSRC). Within WSRC, the responsibility for this work scope resides with the Closure Business Unit Manager for F Closure and H Completion and the Operations Business Unit Manager for RBOF and 3013 Surveillance and Storage Capability Project.

8.11B.5 Schedule

FB Line will continue to operate through FY 2005 to stabilize and package plutonium material for storage, at which time deinventory will be complete. F Canyon and FB Line deactivation will continue as scheduled. Deactivation of the F Canyon, FB Line, and supporting facilities will be complete by November 30, 2006. Both H Canyon and HB Line facilities will remain operational through FY 2010. Deactivation of the H Canyon and HB Line facilities will begin in FY 2011. The 3013 Container Surveillance and Storage Capability project will be completed by March 2007.

8.11B.6 Resources

The cost profile for this PBS for FY 2004-2025 is TBD. This EM cost profile assumes funding for the HEU blenddown process is provided by NNSA. Funding from NNSA is provided as detailed in Figure 8.11B.6.1. The lifecycle baseline cost from FY 2004 - 2025 for the EM funding of this PBS is approximately TBD in FY 2004 dollars. The previous lifecycle baseline assumed H Canyon facilities would be transferred to NNSA at the end of FY 2006, and then returned to EM for deactivation in FY 2014. The assumption for this PMP is to retain the H Canyon facilities within the EM program until alternatives for the disposition of HEU, plutonium materials, and SNF are implemented. This assumption change adds 8 yr of H Canyon and HB Line cost to the EM lifecycle estimate.

DOE will supply 9975 drums, 3013 cans, and SSTs in support of the schedule as government furnished services and items (GFSI), as outlined in the contract.

Technology Needs
In addition to the aforementioned resource requirements, the following technology needs have been identified in support of accelerated cleanup:

- Development of non-destructive assay instrumentation for lay-up of facilities.
  Benefit: Ensure no accountable quantities of special nuclear material are present prior to lay-up of F Canyon
  Development timeframe: FY 2004 – FY 2006

- Development of a technology to recover materials identified in duct work, floors, etc., in facilities that are being closed and, if material is recovered, develop processes to ensure that the material can be dispositioned appropriately.
  Benefit: Ensure that any accountable quantities of SNM identified in facilities scheduled for closure can be removed and dispositioned
  Development timeframe: FY 2004 – FY 2006

- Completion of the development of a technology to process Np solutions to oxide form, and provide technical assistance to H Area during the Np stabilization campaign.
  Benefit: Enables disposition of legacy nuclear material from SRS inventory and shipment to Oak Ridge for production of Pu^{238} at Oak Ridge in support of the US space program
  Development timeframe: FY 2004 – FY 2006

- Investigation of the rate and composition of gas generated due to radiolysis during shipment of neptunium oxide.
  Benefit: Enables neptunium oxide to be safely transported
  Development timeframe: FY 2004 – FY 2006

- Development of a technology to convert non-specification neptunium oxide into neptunium oxide that meets specifications within the processing constraints of the HB Line.
  Benefit: Allow for cost effective management of non-specification material
  Development timeframe: FY 2005 – FY 2006

§ Develop capability to dispose of solutions containing both uranium and plutonium by poisoning them with gadolinium and transferring the solutions to waste tanks for eventual disposal in DWPF glass canisters.
Benefit: Disposition of mixed uranium/plutonium solutions by poisoning with gadolinium and transfer to waste has been determined to be the most cost-effective method for disposition of certain SRS legacy materials. Comprehensive understanding of the process parameters under which this method can be safely used will aid in determining process operating conditions without new experimental work each time disposition of a particular solution is proposed.
Development timeframe: FY 2004 and beyond

§ Precipitation of unwanted solids during processing of nuclear materials.
Benefit: Prevents undesired concentrations of plutonium
Development timeframe: FY 2004 and beyond

8.11B.7 Key Assumptions, Agreements, Alternatives, Trade-offs, and Risk Management

Key Assumptions
The following key assumptions have been used as the basis for the lifecycle cost and schedule development:

§ No facilities will be transferred to another PSO.
§ Specific SRS plutonium identified by DOE-SR will be dissolved in H Canyon and HB Line
§ H Canyon and HB Line will be available for deactivation in FY 2011
§ Old HB Line ventilation project is completed within the contract period
§ H Canyon Deactivation cost profile is based on the F Closure profile
§ Central Laboratory (CLAB) scope will remain the same through FY 2010, then begin deactivation in parallel with H Canyon and HB Line facilities
§ CLAB sample analysis scope will be transitioned to Savannah River Technology Center (SRTC) or other existing facilities during H-Completion deactivation timeframe
§ The scope associated with the disposition of depleted uranium oxide from building 221-22F scheduled for completion in FY 2007 will not impact the F Closure milestone date of November 30, 2006.

Agreements
The following agreements are drivers for this project:

§ DNFSB Recommendation 2000-1
§ Interagency Agreement between NNSA and TVA.

Alternatives, Trade-offs, and Risk Management
The following risks in achieving the PBS objectives have been identified:

- Processes to disposition SNF may not be available in FY 2011, resulting in extended H Canyon operation
- Processes to disposition EM plutonium may not be available in FY 2011, resulting in extended H Canyon operation
- Additional processing needs may be identified, resulting in extended H Canyon operation
- The new Building 235-F 3013 Container Surveillance and Storage Capability line item may not be complete by FY 2007, due to project risks including implementation of new design basis threat (DBT) safeguards and security (S&S) requirements. Delay to the project may impact the cost and schedule baseline
- Major facility failure resulting in loss of capability. Alternatives have not been identified.

Each additional year of H Area operation cost could increase the lifecycle cost by approximately $200,000,000 per year in FY 2004 dollars. Conversely, if established that H Area can be deactivated prior to the availability of the identified new facilities, H Area costs could be reduced by approximately $200,000,000 per year in FY 2004 dollars.

8.11B.8 Performance Monitoring and Evaluation

8.11B.8.1 HQ Monitoring and Evaluation

Monitoring of this PBS at the HQ level is completed primarily through use of the Integrated Planning, Accountability, and Budget System (IPABS) system. Actual cost, schedule, and performance data are collected for each PBS and compared to the established baseline. All elements of the lifecycle baseline are under EM-HQ configuration control. Performance data include the Gold Metrics and the Budget Milestones. Progress toward these measures and any proposed changes are as follows:

Gold Metrics

Material Access Areas (MAAs) Eliminated

	Current	Proposed
Pre FY04	0	0
FY 2004	0	0
FY 2005	0	1
FY 2006	0	0
FY 2007	1	0
FY 2008	0	0
FY 2009	0	0
FY 2010	0	1
FY 2011	0	0
FY 2012	1	0
FY 2013	0	0
FY 2014	0	1
FY 2015	0	0

FY 2016	0	0
FY 2017	0	1
FY 2018	0	0
FY 2019	0	0
FY 2020	2	0
FY 2021	0	0
FY 2022	0	0
FY 2023	0	0
FY 2024	0	0
FY 2025	0	0
Lifecycle Total	4	4

Basis for Change: SR has accelerated the deinventory of facilities as follows:

- FB Line: to be deinventoried in FY 2005
- HB Line: to be deinventoried in FY 2010
- 235-F: to be deinventoried in FY 2014
- KAMS: to be deinventoried in FY 2017

Material packaged for long-term disposition

Units		Pre 04 Actual	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	Lifecycle
Cans	Baseline	54	423	165	42						750
	Proposed		650	336							1,040
Basis for change: The change in this package reflects the identification of additional material requiring stabilization and an acceleration of the program.											
Enriched Uranium (LEU Blenddown)											
Units		**Pre 04 Actual**	**FY04**	**FY05**	**FY06**	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**	**Lifecycle**
Containers	Baseline	146	612	635	635	635	67				2,809
	Proposed		691	635	635	635	67				2,809
Pu/U Residues											
Units		**Pre 04 Actual**	**FY04**	**FY05**	**FY06**	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**	**Lifecycle**
Kg	Baseline	321	78	76							414
	Proposed		69	24							414
Depleted Uranium											
Units		**Pre 04 Actual**	**FY04**	**FY05**	**FY06**	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**	**Lifecycle**
MTU	Baseline	4,551	0	0	186	0	0	3,025	3,025	3,025	23,182
	Proposed		93	72	10,213	8,253	0	0			23,182
Basis for change: The DU metric reflects an acceleration of the disposition of this material to an offsite location.											

Basis for change of (Enriched Uranium and Pu/U Metrics): Proposed annual fiscal year projections have been corrected to add to the correct lifecycle total. The former baseline did not add correctly.

Budget Milestones

Number	Milestone	Current	Proposed
280	Complete Critical Decision 2 (for 235-F 3013 Container Project)	9/30/04	12/6/04

Basis for change:
Milestone #280 - Funding profile change due to DOE delay in approval of CD-0 and delay in providing authorized funding in FY 2003 and FY 2004.

Number	Milestone	Current	Proposed
282	Complete Mk-16/22 Legacy Spent Nuclear Fuel Dissolution	9/30/04	12/19/03 A

Basis for change:
Milestone #282 - No change.

Number	Milestone	Current	Proposed
200	PBS End	9/30/08	9/30/14

Basis for change:
Milestone #200 - Life of project extended to cover operation of H-Area facilities until FY10 and subsequent deactivation.

Number	Milestone	Current	Proposed
284	Begin Processing Neptunium Solutions	3/31/05	

Basis for change:
Milestone #284 - No change.

Number	Milestone	Current	Proposed
285	Complete Deactivation RBOF Facility	9/30/05	

Basis for change:
Milestone #285 - Deinventory was completed ahead of schedule in FY 2003 allowing for an accelerated deactivation of facilities.

Number	Milestone	Current	Proposed
47180	Complete Deactivation FB Line	6/30/06	

Basis for change:
Milestone #47180 - No change.

Number	Milestone	Current	Proposed
47182	Complete Deactivation F Canyon	11/30/06	

Basis for change:
Milestone #47182 - No change.

Number	Milestone	Current	Proposed
47184	Complete H Canyon Unirradiated Mk-22 Tubes	9/30/06	

Basis for change:
Milestone #47184 - Milestone title was changed for clarification.

Number	Milestone	Current	Proposed
NEW	Complete H Canyon Operations		6/30/10

Basis for change:
Milestone #NEW - H Canyon will remain operational through FY 2010.

Number	Milestone	Current	Proposed
47188	Complete HB Line Operations	9/30/06	6/30/10

Basis for change:
Milestone #47188 - HB Line will remain operational through FY 2010.

Number	Milestone	Current	Proposed
NEW	Begin Deactivation H Canyon and HB Line		10/1/10

Basis for change:
Milestone #NEW - EM will deactivate H Canyon and HB Line prior to turnover to PBS SR-0040 for decommissioning in FY 2015.

Number	Milestone	Current	Proposed
NEW	Complete Deactivation HB Line		6/30/14

Basis for change:
Milestone #NEW - EM will deactivate H Canyon and HB Line prior to turnover to PBS SR-0040 for decommissioning in FY 2015.

Number	Milestone	Current	Proposed
NEW	Complete Deactivation H Canyon		9/30/14

Basis for change:
Milestone #NEW - EM will deactivate H Canyon and HB Line prior to turnover to PBS SR-0040 for decommissioning in FY 2015.

Number	Milestone	Current	Proposed
281	Complete Critical Decision 3 (for 235-F 3013 Container Project)	9/30/04	

Basis for change:
Milestone #281 – Funding profile change due to DOE delay in approval of CD-1 and delay in providing authorized funding in FY 2003 and FY 2004. CD-3 will be baselined at CD-2.

Number	Milestone	Current	Proposed
286	Complete F Canyon Deinventory of Depleted Uranium and FB Line Stabilization and Packaging of Plutonium to DOE 3013 Standards	9/30/05	

Basis for change:
Milestone #286 – No change.

Number	Milestone	Current	Proposed
47186	Complete Disposition of Neptunium Solutions	9/30/06	

Basis for change:
Milestone #47186 – No change.

8.11C.8.2 Site Monitoring and Evaluation

Refer to Section 4.3 for a description of the site's performance monitoring and evaluation process.